MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2016/2017

PSM0325 – INTRODUCTION TO PROBABILITY AND STATISTICS

(Foundation in Information Technology / Life Sciences)

21 OCTOBER 2016
3.00 p.m. – 5.00 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **TWO** pages excluding the cover page and the Appendix.

2. Answer all **FIVE** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the answer booklet provided. All necessary working steps **MUST** be shown.

4. **Statistical table** is provided.

Instruction: Answer all **FIVE** questions.

Question 1 (10 marks)

The following data gives the weights of a sample of 100 employees who enrolled in a health program.

Weight	Number of Employees
41 – 50	11
51 – 60	13
61 – 70	27
71 – 80	34
81 – 90	7
91 – 100	8

Calculate

a. the mean weight of the employees. (5 marks)

b. the variance of the weight of the employees. (5 marks)

Question 2 (10 marks)

a. A group of employees are categorized according to their gender and their favourite colour to provide data for the design of a new office space. The data obtained is summarized as follows:

Gender	Favourite Colour		
	Blue	Red	Green
Male	81	29	40
Female	63	45	22

If an employee is selected at random, what is the probability of selecting

i. an employee whose favourite colour is blue? (2 marks)

ii. an employee whose favourite colour is green, given that a male employee was chosen? (2 marks)

b. The probability density function of a random variable X is given below:

$$f(x) = \begin{cases} k(x^2+5); & 1 < x < 4 \\ 0; & \textit{otherwise} \end{cases}$$

i. Find the value of the constant k. (3 marks)

ii. Calculate the mean of X. (3 marks)

Continued ...

Question 3 (10 marks)

a. In a past survey, data showed that the probability that it will rain is 38%. Find the probability that, in the next 15 days, the number of days that will rain

i. is greater than 10. (2 marks)
ii. is between 5 to 9, inclusive. (2 marks)

b. The time taken to complete a project is normally distributed with a mean of 40 minutes and a standard deviation of 10 minutes. If a student is selected at random, find the probability that the student

i. will take less than 55 minutes to complete the project. (2 marks)
ii. will take between 32 to 50 minutes to complete the project. (4 marks)

Question 4 (10 marks)

a. The number of books read by all the 7 students in a class are given:

71 65 59 71 83 80 65

List all the possible samples of size six from this data and construct a sampling distribution of the sample mean. (4 marks)

b. The weight of a product manufactured by a company has a mean of 100 kg with a standard deviation of 30 kg. Find the probability that the weight of a random sample of 50 of this product will be:

i. more than 105 kg. (2 marks)
ii. within 10 kg of the population mean. (4 marks)

Question 5 (10 marks)

The mean time taken by students to answer a HOTS question is 30 minutes, with a standard deviation of 4 minutes. The time taken by a sample of 40 students to answer the HOTS question are collected to determine if the time has improved, and the mean time taken by the 40 students is 28 minutes.

a. Based on the time taken by the 40 students, construct a 95% confidence interval for the mean time taken by all the students. (4 marks)

b. At the 0.01 level of significance, is there evidence to show that the time taken by the students to answer the HOTS question has improved? (6 marks)

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APPENDIX

FORMULA

For Grouped Data

1. Mode = $L+\left[\frac{f_m - f_B}{(f_m - f_B)+(f_m - f_A)}\right]c$

2. Median = $L+\left[\frac{\left[\frac{\sum f+1}{2}\right]-F_L}{f_m}\right]c$

3. Mean =

Sample	Population
$\bar{x}=\frac{\sum mf}{\sum f}$	$\mu=\frac{\sum mf}{\sum f}$

4. Variance =

Sample	Population
$s^2=\frac{\sum m^2 f-\frac{(\sum mf)^2}{\sum f}}{(\sum f)-1}$	$\sigma^2=\frac{\sum m^2 f-\frac{(\sum mf)^2}{\sum f}}{\sum f}$

5. Standard Deviation = $\sqrt{Variance}$